



Illinois Department of Commerce and Economic Opportunity

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24 June 2004

Via U.S. and Electronic Mail (heino.beckert@netl.doe.gov)

Dr. Heino Beckert, NEPA Document Manager
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road, M.S. CO4
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RE: Illinois DCEO Comments on Programmatic Environmental Impact Statement for Implementation of US DOE Carbon Sequestration Program

Dear Dr. Beckert:

The Illinois Department of Commerce and Economic Opportunity - Bureau of Energy and Recycling writes this letter to express support for the comments presented by the Illinois Office of Coal Development at the May 19, 2004 meeting in Rolling Meadows, Illinois regarding the U.S. Department of Energy's Carbon Sequestration Program.

The Bureau of Energy and Recycling shares the Office of Coal Development's view that the alternatives to be reviewed in the Programmatic Environmental Impact Statement (PEIS) should be geologic sequestration techniques that provide stable long-term storage, are cost-competitive, and have no negative effects on the environment. For purposes of scoping this PEIS, the Bureau of Energy and Recycling recommends focusing on geologic sequestration alternatives that are "cost-competitive" with greenhouse gas emission reduction alternatives – such as renewable energy resources derived from wind, solar energy and landfill gas, as well as energy efficiency improvements in power generation, transportation and buildings.

Illinois has geologic characteristics that make this State a potentially significant resource for underground storage of carbon dioxide. The Bureau of Energy and Recycling joins the Office of Coal Development in applauding the work of the U.S. DOE Office of Fossil Energy to develop geologic sequestration technologies that would make it possible for Illinois to use this resource to help reduce greenhouse gas emissions. Thank you for the opportunity to submit comments in connection with this important program.

Sincerely,

/S/

Hans Detweiler, Deputy Director
Department of Commerce and Economic Opportunity – Bureau of Energy and Recycling

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Robert Greco, III
Director
Global Climate Programs

June 22, 2004

Dr. Heino Beckert
NEPA Document Manager for Carbon Sequestration PEIS
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507

Dear Dr. Beckert,

The American Petroleum Institute (API) appreciates the opportunity to offer input to the Department of Energy on its Carbon Sequestration Program. API represents more than 400 companies involved in all aspects of the oil and natural gas industry and strongly supports the Department of Energy's Carbon Sequestration Program at the National Energy Technology Laboratory.

Oil, coal, and natural gas are the dominant sources of energy today and are projected to remain so in the foreseeable future. However, if the concentration of CO₂ in the atmosphere were to be significantly limited, there is currently no single energy technology that can supply affordable energy at a scale large enough to meet global demand with low CO₂ emissions. Carbon sequestration is an important strategy in a portfolio of strategies needed to address this situation.

Much remains to be learned about carbon sequestration before it can be deployed widely. For example, the cost of carbon capture and storage is too high for broad use currently. Research being conducted under the umbrella of the Carbon Sequestration Program is advancing our understanding of carbon sequestration and hopefully will result in technologies that will reduce the cost of capture and storage.

The United States needs to achieve a scientific understanding of carbon sequestration options and needs to be in a position to develop cost-effective, environmentally sound technology options to reduce greenhouse gas emissions should the need arise. This is exactly what the Department of Energy's Carbon Sequestration Program is designed to achieve and why the American Petroleum Institute supports it.

Please contact Steven Crookshank (202.682.8542) or me if you have any questions or if we can be of further assistance.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Robert L. Greco III', is written above the typed name.

Robert L. Greco III
Director, Global Climate Programs



June 21, 2004

Heino Beckert, Ph.D.
NEPA Document Manager for Carbon
Sequestration PEIS
U.S. Department of Energy
National Energy Technology Laboratory
P.O. Box 880
Morgantown, West Virginia 26507

Dear Dr. Beckert:

The Center for Energy and Economic Development (CEED) appreciates this opportunity to respond to the Notice of Intent to Prepare a Programmatic Environmental Impact Statement for Implementation of the Carbon Sequestration Program (*Federal Register*/Vol. 69, No. 77, April 21, 2004/Notices).

CEED is a non-profit organization formed by many of the nation's coal-producing companies, railroads, barge and trucking companies, electric utilities, equipment manufacturers, the men and women of organized labor, and related organizations, for the purpose of educating the public (including public-sector decision-makers) about the benefits of affordable, reliable and environmentally-compatible coal-based electricity. CEED participates financially and with staff interaction in six of the seven regional carbon sequestration partnerships.

1. Sequestration and technology versus mandatory controls

CEED strongly favors a strategy of sequestering carbon dioxide and technology to help the electricity generation sector become more energy efficient as opposed to a mandatory control regime for reducing carbon dioxide (CO₂) concentrations.

A program of carbon sequestration, in combination with emerging and breakthrough technologies capable of economically separating and capturing carbon dioxide from coal use, will enable the United States to sustain our reliance on a natural resource that is the most abundant domestic source of fossil fuel energy. Electricity from coal, which currently accounts for more than half of U.S. electricity, has been and is a cornerstone of the American economy. Parallel research and development efforts by the U.S. Department of Energy (DOE) to commercialize the necessary technologies and identify carbon sequestration opportunities are of extreme importance to meeting our nation's growing demand for electricity, while addressing any reasonable concerns about climate change that may result from manmade emissions of greenhouse gases.

The current public policy debate centers largely around two competing strategies: a) government mandated controls, through a command-and-control regime or a cap-and-trade program, and b) voluntary actions to reduce carbon intensity with technology and sequestration playing vital roles.

The latter alternative (using both terrestrial and geologic sequestration) is vastly superior for several reasons.

First, proposals that seek to mandate CO₂ control must by design, and of necessity, increase the cost of fossil fuel use. With over 50% of the nation's electricity coming from coal, the U.S. cannot afford to make coal an unaffordable part of our energy mix.

Second, mandatory emissions reduction programs hurt the economy and jeopardize our national security without tangible benefit. CEED believes continuing the investment in research, development, and deployment of clean coal technologies and voluntary emissions reduction programs that rely on carbon sequestration to be sound national energy and environmental policy.

Finally, the absence of meaningful participation by developing and under-developed nations was a fundamental weakness of the Kyoto Protocol. As those economies develop, using cap-and-trade or carbon tax regimes to achieve reductions in CO₂ emissions will have no economic appeal. We cannot expect developing nations to adopt such policies. We must embrace an alternative, more appealing path. That path is use of carbon sequestration and technology to dramatically reduce the increase in CO₂ atmospheric concentrations.

CEED reiterates our support of efforts to identify opportunities for both geologic and terrestrial carbon sequestration. We believe it is important to note that the science of terrestrial carbon sequestration appears to us already to be reasonably mature. In support of our perspective regarding terrestrial carbon sequestration, we enclose a copy of *Sequestering Carbon Emissions in the Terrestrial Biosphere*, a report prepared by The Washington Advisory Group, LLC.

The report's authors include Dr. Robert M. White (former President of the National Academy of Engineering), Dr. Norman J. Rosenberg (Senior Staff Scientist, Joint Global Change Research Institute), Dr. Rattan Lal (Professor, School of Natural Resources, The Ohio State University), and Dr. Rosina Bierbaum (Dean, School of Natural Resources, University of Michigan). Their primary finding is:

Most scientists have come to the view that carbon dioxide emissions from all sources can be offset to a significant degree by the sequestration of carbon in terrestrial ecosystems comprising soils, croplands, grazing lands and forestlands, if these ecosystems are properly managed.

2. Specific comments about terrestrial sequestration

CEED observes from our participation in various regional partnerships that many participants already understand and embrace terrestrial carbon sequestration. As summarized by The Washington Advisory Group:

Adoption of recommended management practices can enhance the soil carbon pool, and improve soil quality and productivity. The opportunities to enhance soil carbon include: increasing the soil organic carbon concentration by applying quantities of biomass to the soil and improving water and nutrient use efficiencies and improving biomass productivity. Soil and vegetation management approaches provide ways of enhancing biomass productivity and returning more biomass both above and belowground to the soil. Losses of soil organic carbon caused by accelerated soil erosion; mineralization and leaching can be arrested.

Grazing lands offer similar opportunities for carbon sequestration through improved species, integrated nutrient management and controlled grazing. Restoring degraded soils is an important option to sequester carbon and improve the environment. (at page 1)

As you will observe from Figure 1 on page 8 of the report, it is apparent "that soil carbon sequestration *alone* could make up the difference between the expected and desired emissions trajectories in the first three or four decades of the 21st century." The report's authors believe that we can realize the potential of soil carbon sequestration without additional net cost to the economy because of the known benefits of organic matter in soils.

CEED also observes from our experience with the regional partnerships that considerable effort in the first phase of work seeks to determine the preliminary suitability of various opportunities for geologic sequestration. In all but two of the partnerships, terrestrial sequestration opportunities do not appear to receive similar emphasis. This may be because, as we state, the science of terrestrial sequestration already appears to be mature and it is assumed what already is widely known can be incorporated in the second phase of work by the partnerships as they develop regional plans. We are, however, concerned that much of the potential for early action on terrestrial sequestration can come about only through close cooperation among the activities of the regional partnerships, DOE, and the U.S. Department of Agriculture (USDA).

While not all soils are particularly suitable for terrestrial sequestration, diverse combinations of forestland, agriculture land, and grassland can function as dispersed potential sinks under appropriate management. USDA, through its management of national forests and its multiple interfaces with farmers, can play an integral role in this regard. We also will note that the U.S. Department of Interior, through its management of grasslands in the West, also could play a vital role in the success of such a program.

3. Specific comments about geologic sequestration

One of the most attractive aspects of a program of geologic sequestration is its potential for enhancing U.S. energy independence. The petroleum industry already has amassed extensive experience using CO₂ "flooding" for tertiary oil recovery in the Permian Basin. The primary constraint to more extensive use of CO₂ for enhancing oil recovery is the lack of abundant, economic sources of the CO₂ itself. Siting of technology capable of separating CO₂ from coal in close proximity to what otherwise are regarded to be depleted oil fields could enable "lifting" of petroleum otherwise regarded to be uneconomic for recovery. Petroleum lifted in this manner represents a significant, untapped domestic energy resource.

Similar potential exists in using CO₂ to force natural gas from strata that presently are inaccessible due to difficult geologic conditions. Likewise, CO₂ could be used to force methane from unmineable coal seams. Again, use of CO₂ in this manner represents significant potential enhancement of domestic energy resources. At least at first blush, the economics of locating an abundant source of CO₂ in proximity to such geologic opportunities appear to enhance the benefit/cost ratio for both the CO₂ producer (because of an available market for the product) and for the purchaser (because of an abundant source of supply).

4. International implications of sequestration

A program that demonstrates regionally-appropriate methods of sequestering carbon dioxide is of potentially vast benefit to other nations with abundant coal reserves.

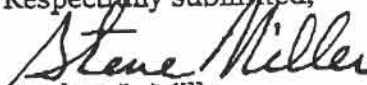
Clearly, developing nations will rely on domestic reserves of coal to advance their economies. Nations participating in the Carbon Sequestration Leadership Forum have embraced this assumption as they seek international cooperation in developing innovative and breakthrough technology for coal use. Sound methods of carbon sequestration will be crucial to persuading developed and developing nation to embrace such technologies.

U.S. experiences with regional programs of carbon sequestration can contribute significantly to international acceptance of the technology-sequestration strategy in lieu of government mandates. The regional partnerships will advance the monitoring-verification techniques needed to assure the reliability of carbon sequestration in reducing atmospheric carbon concentrations.

Conclusion

CEED believes that DOE (and USDA through its efforts) is on the right track in developing a strategy to address any reasonable concerns about how manmade emissions of greenhouse gases might cause undesired climate change. The combination of technology and carbon sequestration can serve as a bridge to the day when we can sequester greenhouse gases at the point of coal use. This strategy will allow the American economy to grow and our people to prosper while we take commonsense measures to meet our environmental responsibilities. We thank you for the opportunity to comment.

Respectfully submitted,


Stephen L. Miller
President and CEO

Enclosure: *Sequestering Carbon Emissions in the Terrestrial Biosphere*

From: Dave Bayless <bayless@ohio.edu>
To: <heino.beckert@netl.doe.gov>
Date: 6/18/2004 7:26:38 PM
Subject: Carbon Sequestration Program EIS Input

Dr. Beckert,

I would like to take this opportunity to comment on the environmental impact statement (EIS) for the Department of Energy's Carbon Sequestration Program. My comments are related to the role of the program in addressing problems on both a national and global scale.

There are two specific programs that I would highly encourage the Department of Energy to focus funding for development of suitable carbon capture and sequestration technologies. Those programs are FutureGen and the Carbon Sequestration Core R&D program.

FutureGen could provide a true demonstration of carbon control in a holistic manner at a power plant. While the regional partnerships might be able to demonstrate bits and pieces of sequestration technology, it is the integration in to a "real" plant with real operating concerns and "real" sequestration that will be critical to the future of fossil generation. How the subsystems respond in an integrated fashion to work to produce power for the grid will be the true test of all capture and sequestration technologies. A few wells drilled around the country could provide a few data points, but the industry needs a full demonstration.

The Carbon Sequestration Core R&D program is also critical because so many questions remain about separation and sequestration. It is clear that one option won't solve all the problems. For example, people may be excited about chemical looping technology, but implementing it at the 300 MW scale is so potentially expensive no one may ever use it for power generation. Many, many other questions must be answered before it can be used. Without a doubt, there is a tremendous need to develop lower-cost, more effective technology to reduce carbon emissions.

I highly support the Department's efforts in these areas and hope that they receive adequate funding for their critical missions.

Respectfully submitted,
David J. Bayless

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From: <Melzerls@aol.com>
To: <Heino.Beckert@netl.doe.gov>
Date: 6/14/2004 6:09:09 PM
Subject: Environmental Impact of Carbon Sequestration

Heino: The following are my thoughts on the environmental impacts of carbon sequestration. I will specifically avoid addressing the permanence and credit-worthiness of the various methods but they clearly must play a role in the acceptability as would the environmental.

1) Carbon Capture: This is an area where research is most definitely warranted. Programs will be fraught with concerns of endorsement and industry subsidies but, in my opinion, a role for the government is clearly justified. Ultimately, large scale demonstration projects are the key to proving utility and commerciality. Carbon capture research must be done in concert with sequestration concepts as it does no good to capture it without having an environmentally benign place to put it.

2) Carbon Storage:

Ocean Sequestration: I am very uncomfortable about the long term environmental effects of sequestering carbon in the oceans. Conduct of thorough research on the impacts could persuade me otherwise but am very skeptical that large volumes could be sequestered without local and perhaps, regional and global, environmental impacts.

Terrestrial Sequestration: I have no environmental issue with sequestering carbon in either forest or agricultural lands. However, I will say that permanence is definitely an issue.

Geological Sequestration: a) Trapped reservoirs: I am very comfortable that trapped reservoirs can be successfully used to sequester carbon and done in an environmentally benign manner, especially if done in a mass balanced fashion: i.e. no incremental pressure. I feel so comfortable with this approach that I would suggest this can be done immediately with measurement, monitoring and verification. MMV research can and should be done on trapped reservoir sequestration.

b) Untrapped aquifers: I am currently uncomfortable with the concept of sequestering carbon in untrapped reservoir conditions. However, research is justified in this area and I could be persuaded through such research after conduct of successful large scale demonstration projects. MMV techniques developed in a) above could be used in the untrapped aquifers application and would be even more important in showing environmental acceptability.

3) MV: See comments above

4) Advanced Concepts: I would think that any advanced concepts for carbon sequestration is a natural research area for USDOE. However, I could not comment on the environmental impact without specifics.

For clarification or more detail please contact Steve Melzer @
melzerls@AOL.COM

of 7 June 04



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June 3, 2004

Dr. Heino Beckert
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Morgantown, WV. 26507-0880

Dear Dr. Beckert,

I appreciate the opportunity to provide comments into the DOE Carbon Sequestration Programmatic EIS as well as the opportunity to attend the June 2, 2004 public hearing in Atlanta.

First I would like to commend the DOE for recognizing and promoting carbon sequestration as a viable means of addressing concerns and remediation the impacts of elevated CO2 levels in our atmosphere. While there continues to be much debate on the actual or potential impacts of elevated CO2 levels and other greenhouse gases on our world's climate, the implementation of cost effective and responsible programs for reducing and remediation emissions is timely and prudent.

However I am concerned that in efforts to gain agency, industry and public support the DOE may in fact compromise the very objective of capturing and reducing greenhouse gases. These concerns were highlighted in last night's presentations by DOE as well as in comments received by the US Fish and Wildlife Service.

While the DOE presentation correctly identifies deep oceans and deep saline formations and depleted oil and gas reservoirs as having enormous potential capacity for storage, the technical, economic and practical uses of these sinks appears to be vastly overstated when compared to more viable and cost effective options utilizing terrestrial storage. Theoretical calculations of the potential for carbon storage in deep oceans is just theoretical. It is highly unlikely that we will ever have cost effective, practical and environmentally acceptable means of increasing the natural fertility of our oceans so that they can absorb and store additional amounts of Carbon. The technical means for stripping CO2 from the atmosphere and injecting it into deep mines is available. However at this time it is generally cost prohibitive and is likely to remain so for the foreseeable future.

On the other hand we have the technology to actively promote long-term cost effective sequestration in actively growing forests and in forest products. Rather than requiring vast expenditures of energy inputs from electricity or fossil fuels to accomplish carbon sequestration in managed forests relies primarily on the natural processes with limited intervention and inputs from man. Cost-effective technology achieving growth rates of 3-4 times that of natural forests in the SE is currently being implemented on

millions of acres of private forests across the South. Sequestration in managed forests also allows for conversions of atmospheric carbon to long-term solid carbon products in the form of wood and paper thus freeing the land base to continue the process of removing atmospheric C. These processes are credible, cost effective, provide additional benefits to society and practical to implement. Therefore I strongly encourage the DOE's assessment to more accurately and carefully reflect the practical and achievable means available for reducing atmospheric carbon.

In the last nights comments the USFWS promoted the use of the DOE carbon sequestration program as a means of promoting their agencies' agenda of creating "natural habitats". While every credit should be given for carbon stored in efforts to establish longleaf wire grass and other communities of special interest, the DOE MUST take the necessary steps to make sure DOE's objectives of reducing atmospheric C are not hijacked by special interest groups. Converting fully stocked and managed southern pine forests to sparsely stocked slow growing longleaf pine or upland hardwoods would actually result in a net reduction in the amount of atmospheric carbon removed and stored in today's southern forests.

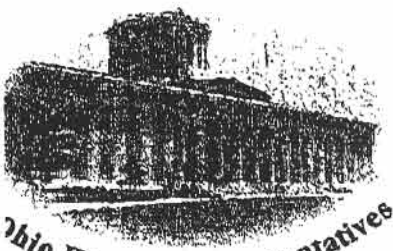
Finally I strongly encourage the DOE to work with and promote regional projects with the private sector that are both cost effective and practical. For example, through the efforts of the GA Forestry Association and GA Forestry Commission, working with the GA General Assembly, Georgia has set a framework in place for recording transactions of sequestered carbon from agricultural and forest products. DOE should consider financial and technical support of efforts now underway to develop cost effective and credible means for auditing and verifying the carbon units that are recorded in this transactional registry.

Again I appreciate the opportunity to comment.

Sincerely,



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June 1, 2004

Mr. Heino Beckert, Ph.D.
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for Carbon Sequestration PEIS
U.S. DOE/National Energy Technology
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POB 880
Morgantown, WV 26507

RE: USDOE/NETL's Carbon Sequestration Program PEIS

Dear Dr. Beckert:

Thank you for the opportunity to comment on USDOE's
Programmatic Environmental Impact Statement regarding its
Carbon Sequestration Program.

As someone born, raised and living in Ohio Appalachian coal
country, I have long appreciated the value of coal to the region. In
my long career in public service as mayor of my hometown,
director of the Governor's Office of Appalachia, Lieutenant
Governor, and the current chair of the Ohio House of
Representatives Energy and Environment Committee, I also have
come to appreciate the critical contribution of coal to this country's
production of lower cost electricity. In every realistic scenario,
coal plays an important role in this nation's electricity output, and
hence, to our overall economy.

Nevertheless, it is incumbent upon us to use this nationally-secure
energy resource in an environmentally sound manner. One item
of increasing concern is that of carbon dioxide emissions. It
seems increasingly plausible that such emissions may become
restricted by federal policy within the next decade or so. If such
becomes the case, it is imperative we begin immediately to
develop and deploy new technologies and processes which can
address carbon dioxide emissions from coal-based power
generation, so that we can continue the use of our most abundant
and secure energy resource. Therefore, I support the
implementation of USDOE's Carbon Sequestration Program.

Among other things in the program, I am especially supportive of
the proposed **FutureGen** initiative. The near-zero emissions plant
would find a very fertile setting here in Ohio. Our communities are
familiar with coal-based power generation; we have the

waterways, barge, rail and truck transportation infrastructure. Ohio also boasts a major electric transmission line system, the geology, a great workforce, a strong university system actively engaged in coal R&D, and—of course—the coal. Ohio has an excellent power siting permitting system, and a state EPA quite familiar with coal and power plant related matters. Several other state incentives programs also appear to be applicable to the FutureGen effort. These are just a few of the advantages Ohio can offer to this project.

While I support the overall concepts of the Carbon Sequestration Program, I also note that it is important for USDOE to continue its support of its base coal R&D program, from which much of the antecedent work for the Carbon Sequestration program and FutureGen project will come. Further, the needs of our existing power plants should not be overlooked, and should be addressed through the base coal R&D program. Undercutting the base coal R&D program now will only serve to undercut your more advanced programs and projects (such as FutureGen) later.

Again, thank you for the opportunity to comment. I will be most interested in the results of your work, as it potentially has significant impact to those in my district, my state, and my country.

Sincerely,



Nancy P. Hollister
Ohio District 93

4 June 04



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May 30, 2004

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Dear Dr. Beckert,

On behalf of the Houston Sierra Club (HSC) I am submitting these scoping comments for the Programmatic Environmental Impact Statement (EIS) for the U.S. Department of Energy (DOE) Fossil Fuel Carbon Sequestration Program. **When the EIS is available for public comment the HSC requests that it be mailed, to the address found at the end of this letter, a hard copy with all appendices.**

Our scoping comments are as follows:

1) **The entire carbon sequestration program (CSP) assumes that we continue to use coal, oil, and natural gas as the primary and majority fuels for many decades to come.** Every kilowatt of power generated that does not use coal, oil, or natural gas lessens the effects of global warming and reduces the increase of greenhouse gases.

The HSC requests that the DOE document how the CSP will or will not promote the continued use of highly CO2 emitting fuels like coal, oil, and natural gas. The EIS must also document the impacts that an increase, reduction, or continued promotion of coal, oil, or natural gas will have on the environment and the need for the CSP. **In essence does the CSP focus on using coal, oil, and natural gas when we need to get off of these energy sources.**

2) **The HSC supports carbon sequestration through restoration of unproductive and productive lands.** In particular instead of talking only about reforestation the DOE should talk about reducing afforestation. By reducing afforestation DOE will prevent the release of carbon from mature or older growth forests which are becoming rarer and are important for biological diversity, ecological processes, oxygen generation, soil retention, flood water buffering, water quality enhancement, climate extreme dampening, and other important side benefits. The DOE should look for areas that can be added to National Wildlife Refuges, National Forests, National Parks, Bureau of Land Management lands, and state, local, or private protected lands that can be used as buffers or which protect important ecological areas.

The DOE should not focus on tree planting because of the limited ability of such efforts to reduce CO2 emissions. The DOE should also not be a party to buying lands for the

"When we try to pick out anything by itself, we find it hinged to everything else in the universe." John Muir

growing of commercial pine plantations which are advocated by some because they take up CO₂ faster than older trees. Such a program could be used as a justification for logging and destroying mature and older growth forests which are important carbon sinks and should not be disturbed or altered by human actions. The DOE should also not allow foresters to log trees due to so-called forest health concerns. Logging, burning, and windrowing of tree debris results in the rapid decay of woody material and releases huge amounts of CO₂ quickly. Dying is a natural part of forest ecology, allows for the storage and gradual release of CO₂, and should be protected by the CSP.

The DOE EIS could help us locally save some of our existing natural forests. If the DOE proposals allow the acquisition of land that is forested or will be restored to a forested condition, **then lands could be bought and added to Sam Houston National Forest, the Big Thicket National Preserve, and the U.S. Fish & Wildlife Service's Columbia Bottomlands and Trinity River National Wildlife Refuge programs.**

A land acquisition program would result in the protection of ecologically/biologically important lands; buffer existing lands from sprawl development; would reduce fragmentation of existing public lands; provide additional recreational lands near the Nation's fourth largest city; protect wildlife/sensitive species; protect water quality; and provide lands for quiet/solitude/spiritual reflection.

3) The bulk of the dollars for the CSP should go for controls that are added onto large CO₂ emitters like coal fired power plants or oil fired boilers. These add-on controls are important stop-gap measures that should be used in the interim as we utilize more and more renewable and alternative energy sources that generate less, little, or no CO₂ emissions.

4) The impacts of the injection of huge quantities of CO₂ into the subsurface needs careful consideration. In particular groundwater quality and movement needs to be studied very carefully. This is particularly important since we need to contain such emissions for 100's if not 1,000's of years. This same long-term concern for environmental integrity must also be carefully studied for the storage of CO₂ in the ocean.

5) The HSC strongly supports monitoring to verify that actual emissions are being generated, reduced, or eliminated. We are concerned about mass emission cap and trade programs. The ones we have seen in our area dealing with ozone precursor reductions have failed because emission inventories are so inaccurate that actual emissions are orders of magnitude greater than estimated. We do not want to give industry credit for reducing CO₂ and then find that later they actually reduced their emissions much less than thought. Industry must actually earn their credits. Without accurate monitoring to ensure where CO₂ goes and whether it is contained, captured, or transformed there can be no mass emissions cap and trade program. **Remember, trust, but verify.**

6) The HSC agrees with the DOE philosophy of "no legacy for future generations" when dealing with CO₂ emissions and global warming. However, if huge technological fixes are used instead of fuel switching from coal, oil, and natural gas to other less CO₂ emitting energy technologies then there will be legacies for future generations. Future generations will become more dependent on the very energy sources that generate the most CO₂. Just the complexity and energy use of

technologies mentioned in the handout "Carbon Sequestration Technology Roadmap and Program Plan, 2004, are sobering.

7) On page 4, Table 1, Pathways Column, Sequestration/Storage Row, Carbon Sequestration Technology Roadmap and Program Plan 2004, the phrase "Silviculture practices" is used. What is meant by this phrase? The HSC does not support logging of mature and older growth forests and the use of monoculture plantations as acceptable silviculture practices.

8) On page 4, Table 1, Metrics for Success 2012 Column, Sequestration/Storage Row, Carbon Sequestration Technology Roadmap and Program Plan 2004, the prediction of CO2 storage capacity is for an accuracy of plus or minus 30% accuracy. The accuracy should be better than this. The program should have a goal of plus or minus 15% accuracy.

9) On page 4, Table 1, Metrics for Success 2012 Column, Monitoring, Mitigation, & Verification Row, Carbon Sequestration Technology Roadmap and Program Plan 2004, the DOE must reveal to the public what the loss of 5% of COs means in tons of CO2 emissions. If the storage area is large this could be a considerable amount of CO2 not captured. A 95% level of emissions reduction may not be sufficient.

10) On page 9, Geologic Sequestration, Carbon Sequestration Technology Roadmap and Program Plan 2004, monitoring is contingent on finding all possible escape routes and either capping them or accounting for the losses of CO2 that they allow. In particular, the HSC is concerned about the tens of thousands of oil/gas and water wells that have been drilled and have either been capped or have not been capped. We do not know how long capped wells will remain sealed to the atmosphere or if they do. We do not even know the location of all wells. We do not know how many wells have not been capped. This very basic information must be gathered first before any storage area can be assessed for its appropriateness for storing CO2 for 100's to 1000's of years. This one problem could make the use of geologic storage areas doubtful or much less important than other wise would be the case.

11) On page 9, Geologic Sequestration, Carbon Sequestration Technology Roadmap and Program Plan 2004, the DOE states the following, "As a sequestration option, depleting oil reservoirs that are amendable to CO2 EOR provide a value-added benefit in terms of revenues from enhance oil production which can partially offset the cost of CO2 capture." The disbenefit of providing more oil which will be burned and will emit large amounts of CO2 must also be factored into the positive and negative environmental impacts that the EIS will reveal to the public. The amount of CO2 and other air pollutants generated by burning this oil and its impacts on global warming must be addressed in the EIS.

12) On page 12, Terrestrial Sequestration, Carbon Sequestration Technology Roadmap and Program Plan 2004, this is the only place where the DOE states that "Early efforts include tree plantings, no-till farming and other agricultural practices, and forest preservation." The HSC wholeheartedly support "forest preservation" especially the protection of native mature or older forests and lands that will buffer already existing areas that are protected like National Parks, National Wildlife Refuges, and National Forests.

13) On page 12, **Terrestrial Sequestration, Carbon Sequestration Technology Roadmap and Program Plan 2004**, the DOE states that, "More advanced research includes the development of fast growing trees and grasses and deciphering the genomes of carbon storing soil microbes." The HSC is opposed to genetic engineering of any organism. Using organisms that exist in Nature or cross breeding those with traits that human deem desirable is acceptable but it is not acceptable to put the genes of one organism into another. The impact on the environment is too great and or too unknown to allow this manipulation of the material of life.

14) On page 12, **Ocean Sequestration, Carbon Sequestration Technology Roadmap and Program Plan 2004**, the HSC agrees with DOE that not enough is known about the oceans to use them for CO2 storage. We are very concerned that DOE will allow manipulation of the oceans for CO2 storage without fully understanding the consequences. We do not favor altering ecosystems whether they be near the surface of the ocean or in deep ocean or bottom ecosystems.

15) On page 13, **Table 3, Priority Research Pathways Column, Terrestrial Sequestration Row, Carbon Sequestration Technology Roadmap and Program Plan 2004**, the DOE uses the phrase "optimizing silvicultural practices for degraded lands." Define what this means and what it includes. The HSC does not support logging of mature and older growth forests and the use of monoculture plantations as acceptable silviculture practices.

16) On page 13, **Table 3, Cross Cut Pathways Column, Terrestrial Sequestration Row, Carbon Sequestration Technology Roadmap and Program Plan 2004**, the DOE used the phrase, "Enhanced carbon transfer from plant to soil." Define what this means and what it includes. The HSC does not support genetic engineering.

17) On page 14, **Monitoring, Mitigation, & Verification, Carbon Sequestration Technology Roadmap and Program Plan 2004**, the DOE states, "Mitigation capability will provide a response to CO2 leakage or ecological damage in the unlikely event that it should occur." While we applaud DOE for having a game plan if leaks occur, it does not engender confidence that there may be leaks. DOE needs to explain fully in the EIS how these leaks would occur and how they would be capped or in other ways mitigated.

18) On page 15, **Table 4, Technology Roadmap Current State of the Art Column, Soils MM&V Row, Carbon Sequestration Technology Roadmap and Program Plan 2004**, the accuracy of 5-30% is not good enough. The DOE should set a goal of 5-15% for current on-the-ground measurements accuracy.

19) On page 15, **Table 4, Supporting Program Activities R & D Highlights Column, Above Ground MM&V Row, Carbon Sequestration Technology Roadmap and Program Plan 2004**, the DOE needs to flyover and measure other types of forest other than just the Delta National Forest in Mississippi. The Delta National Forest is managed as a pine plantation that is relatively young in age. Other forests including those from other parts of the country, with other species that are dominant, and various ages including those with mature and older growth trees must be measured.

20) On page 15, **Table 4, Supporting Program Activities Program Goals Column, Soils MM&V Row, Carbon Sequestration Technology Roadmap and Program Plan**

2004, the MM&V program must subtract the normal uptake of CO₂ from the existing natural or human altered habitats so there will be a baseline CO₂ reading.

21) On page 17, Table 5, Title Column, Novel Niches Row, **Carbon Sequestration Technology Roadmap and Program Plan 2004**, the DOE states that it wants to create strains of microbes. The HSC is opposed to using genetic engineering to create any strains of microbes.

22) On page 19, B. Regional Partnerships, the DOE states that it expects that the regional partnerships will become self-sustaining. The HSC believes that this criteria could be detrimental to the appropriate research needed to make technologies reality. This burden will force these partnerships to worry more about money than science.

23) On page 19, I. Regional Carbon Sequestration Atlases, **Carbon Sequestration Technology Roadmap and Program Plan 2004**, the HSC requests a copy of the Atlas that covers Texas.

24) On page 22, Education and Outreach, **Carbon Sequestration Technology Roadmap and Program Plan 2004**, the DOE mentions that there are environmental issues associated with carbon sequestration that need to be explored, understood, and addressed. The DOE in the materials released for this scoping for the EIS should list the ones that are known now to allow the public to review and comment on this list.

25) On page 22, Global Climate Change Curriculum, **Carbon Sequestration Technology Roadmap and Program Plan 2004**, concerning the middle school curriculum, what is the bias of this curriculum since someone will have to determine what he/she considers is a trade-off.

26) **Carbon Sequestration Technology Roadmap and Program Plan 2004**, the entire document is difficult to read for the ordinary citizen. There is too much lingo like portfolio, venue, etc. words that need to be made easier to understand. The public deserves and the National Environmental Policy Act (NEPA) requires that EISs be easy to understand. DOE needs to do a better job. This publication could have been made about 1/3 shorter and not lose the detail it has. Do a better job next time.

27) During the public meeting that the HSC attended on May 24, 2004 in Humble, Texas a microphone was not used to explain the running of the meeting. All DOE personnel should use a microphone during public meetings.

28) Finally, the HSC supports close examination of the one question that under-girds the entire CSP. That question is, "**What is best for the public?**" This does not mean what is best for a certain industry or a political power broker but what is best for the everyday citizen and not the wealthy, powerful, and elite. DOE personnel must keep this question uppermost in their thoughts as this EIS is developed.

The Houston Sierra Club appreciates this opportunity to comment. Thank you.

Sincerely,

A handwritten signature in cursive script that reads "Brandt Mannchen".

Brandt Mannchen
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